

REF A0



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(19)



(11)

EP 1 072 969 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
31.01.2001 Bulletin 2001/05(51) Int. Cl.⁷: G06F 3/037

(21) Application number: 00305171.1

(22) Date of filing: 19.06.2000

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 29.06.1999 US 342713

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(54) User interface for navigation and control of a printing system

(57) The present invention relates to a printing system, and more particularly to a user interface for navigating and controlling a printing system to generate documents received from one or more input units including a computer network, scanner, modem, etc. Since the operator or user wishes to offer a wide variety of printing options to customers and complete customer orders as quickly as possible, minimizing the interruption of print jobs is a very important priority. By replenishing supplies such as stock and toner in a timely

fashion, the utilization of the printing systems can be maximized. In order for the operator to more efficiently utilize the printing system to perform a large number of print jobs with as few interruptions as possible, the present invention provides a user friendly navigational tool, which can provide the operator with information regarding the amount of printing supplies currently available in the printing system.

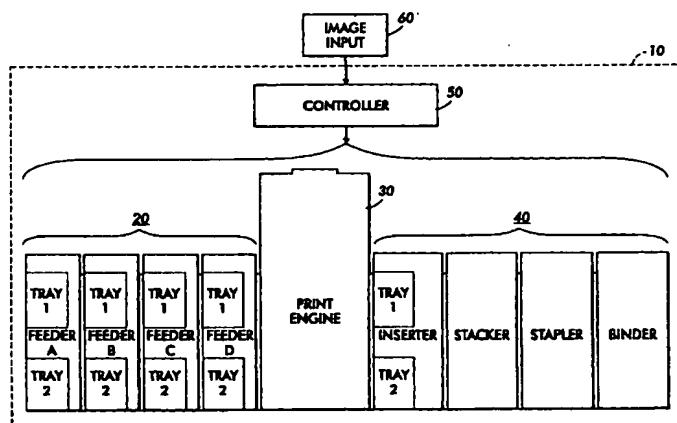


FIG. 1

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Description

[0001] The present invention relates to a printing system, and more particularly to a user interface for navigating and controlling a printing system to generate documents received from one or more input units including a computer network, scanner, modem, etc.

[0002] Present and future high capacity printing systems are intended to provide an operator or user with as many job programming options and selections as reasonably possible. For example, at least four developer housings containing four different types of toner are utilized to provide color copying. Further, operators wish to choose from a very large variety of stock. Stock is the print media or support material on which prints are made. The number of print media choices is very large considering the great number of different sheet sizes, colors, and types that are used by customers today. The number is even larger due to the printing needs of different foreign countries.

[0003] Since the operator or user wishes to offer a wide variety of printing options to customers and complete customer orders as quickly as possible, minimizing the interruption of print jobs is a very important priority. By replenishing supplies such as stock and toner in a timely fashion, the utilization of high capacity printing systems can be maximized.

[0004] A large amount of information concerning the status of the current print job and the requirements of requested print jobs which have not yet been performed, is required to maximize the utilization of the printing system. In order for the operator to more efficiently utilize the printing system to perform a large number of print jobs with as few interruptions as possible, there is a need for a user friendly navigational tool, which can provide the operator with information regarding the amount of printing supplies currently available in the printing system.

[0005] In one embodiment of the present invention, a graphical user interface for providing operating information of a printing system on a display screen comprises a depiction of a printing system shown on the display screen including icons of at least one feeder, print engine and finisher, and a display unit displaying operator information of a desired icon on the display screen by selecting the desired icon. A desired icon is selected by pointing a cursor at the desired icon and keying a mouse or a key on the keyboard to select the desired icon. The desired icon may also be selected by highlighting a desired icon and keying a mouse or a key on the keyboard to select the desired icon. The graphical user interface further comprises a multiuse job progress indicator, including total time, elapsed time and time remaining for a current print job, shown on the display screen. The graphical user interface further comprises depiction of a pathway access window. The operator information comprises a depiction of different toners available to the printing system, a depiction of

magnification, a depiction of registration information, a depiction of tray information, and a depiction of finisher information. The operator information further comprises a depiction of stacker information, inserter information, a depiction of stapler information, and a depiction of binder information.

[0006] In one embodiment of a printing system, the printing system prints image data received from a computer network, scanner or other image data generating

device on a support material. The printing system comprises: a supply unit having a plurality of feeders, wherein each feeder has at least one tray for storing support material; a controller including a system controller processing the received image data, and a user interface comprising a depiction of a printing system shown on the display screen, including icons of at least one feeder, print engine and finisher, and a display unit displaying operator information of a desired icon on the display screen by selecting the desired icon; a print engine including a charging unit charging a surface of a photoconductive belt, a first exposure unit exposing a photoconductive belt to create an electrostatic latent image based on the received image data at the direction of the system controller, a first developer unit having first color charged toner particles, which are attracted to the electrostatic latent image, a second exposure unit exposing the photoconductive belt based on the received image data at the direction of the system controller, a second developer unit having second color charged toner particles, which are attracted to the electrostatic latent image, a third exposure unit exposing the photoconductive belt based on the received image data at the direction of the system controller, a third developer unit having third color charged toner particles, which are attracted to the electrostatic latent image, a fourth exposure unit exposing the photoconductive belt based on the received image data at the direction of the system controller, a fourth developer unit having fourth charged toner particles, which are attracted to the electrostatic latent image, a transfer unit receiving support material and transferring the toner from the photoreceptor belt to the support material, a fuser assembly receiving the support material from the transfer unit and permanently affixing the toner to the sheet of support material, and a cleaning unit cleaning the photoreceptor belt; and a finishing unit, coupled to the print engine, the finishing unit comprising at least one of a stacker, binder, stapler and inserter.

[0007] In another embodiment of a printing system, the printing system prints image data received from a computer network, scanner or other image data generating device on a support material. The printing system comprises: a supply unit having a plurality of feeders, wherein each feeder has at least one tray for storing support material; a controller including a system controller processing the received image data, and a user interface comprising a depiction of a printing system shown on the display screen including icons of at least

one feeder, print engine and finisher, and a display unit displaying operator information of a desired icon on the display screen by selecting the desired icon; a print engine including a charging unit charging a surface of a photoconductive belt, at least one exposure unit exposing a photoconductive belt to create an electrostatic latent image based on the received image data at the direction of the system controller, at least one developer unit having charged toner particles, which are attracted to the electrostatic latent image, a transfer unit receiving support material and transferring the toner from the photoreceptor belt to the support material, a fuser assembly receiving the support material from the transfer unit and permanently affixing the toner to the sheet of support material, and a cleaning unit cleaning the photoreceptor belt; and a finishing unit, coupled to the print engine, the finishing unit comprising at least one of a stacker, binder, stapler and inserter.

[0008] A particular embodiment in accordance with this invention will now be described with reference to the accompanying drawings; in which:-

Figure 1 shows a digital printing system into which the preferred embodiments may be incorporated; Figure 2 is a general block diagram of the printing system shown in Figure 1; 25
Figure 3 is a general diagram of a few of the components of the user interface shown in Figure 2; Figure 4 is a view depicting an exemplary graphical representation of printer status window and pathway access window displayed on a user interface screen of the printing system shown in Figures 1 and 2; 30
Figure 5 is a view depicting an exemplary graphical representation of print engine settings and supplies displayed on a user interface screen of the printing system shown in Figures 1 and 2; Figure 6 is a view depicting an exemplary graphical representation of print engine consumables displayed on a user interface screen of the printing system shown in Figures 1 and 2; 35
Figure 7 is a view depicting an exemplary graphical representation of magnification settings displayed on a user interface screen of the printing system shown in Figures 1 and 2; Figure 8 is a view depicting an exemplary graphical representation of image to stock registration settings displayed on a user interface screen of the printing system shown in Figures 1 and 2; 40
Figure 9 is a view depicting an exemplary graphical representation of perfecting registration displayed on a user interface screen of the printing system shown in Figures 1 and 2; Figure 10 is a view depicting an exemplary graphical representation of color registration displayed on a user interface screen of the printing system shown in Figures 1 and 2; 45
Figure 11 is a view depicting an exemplary graphi-

cal representation of color curves displayed on a user interface screen of the printing system shown in Figures 1 and 2;

Figure 12 is a view depicting an exemplary graphical representation of tray information of a feeder displayed on a user interface screen of the printing system shown in Figures 1 and 2;

Figure 13 is a view depicting an exemplary graphical representation of feeders displayed on a user interface screen of the printing system shown in Figures 1 and 2;

Figure 14 is a view depicting an exemplary graphical representation of finisher tray information of an inserter displayed on a user interface screen of the printing system shown in Figures 1 and 2;

Figure 15 is a view depicting an exemplary graphical representation of stacker information displayed on a user interface screen of the printing system shown in Figures 1 and 2;

Figure 16 is a view depicting an exemplary graphical representation of stapler information displayed on a user interface screen of the printing system shown in Figures 1 and 2;

Figure 17 is a view depicting an exemplary graphical representation of binder information displayed on a user interface screen of the printing system shown in Figures 1 and 2;

Figure 18 is a view depicting an exemplary graphical representation of finisher information displayed on a user interface screen of the printing system shown in Figures 1 and 2; and,

Figures 19 is a flow chart showing the process of accessing information.

[0009] Figure 1 shows a digital printing system 10 of the type suitable for use with the preferred embodiment for processing print jobs. As shown, the digital printing system includes document feeders 20, a print engine 30, and finishers 40 and controller 50. The digital printing system 10 is coupled to an image input section 60.

[0010] As shown in Figure 2, the image input section 60 transmits signals to the controller 50. In the example shown, image input section 60 has both remote and onsite image inputs, enabling the digital printing system 10 to provide network, scan and print services. In this example, the remote image input is a computer network 62, and the onsite image input is a scanner 64. However, the digital printing system 10 can be coupled to multiple networks or scanning units, remotely or onsite. Other systems can be envisioned such as stand alone digital printing system with on-site image input, controller and printer. While a specific digital printing system is shown and described, the present invention may be used with other types of printing systems such as analog printing systems.

[0011] The digital printing system 10 can receive image data, which can include pixels, in the form of dig-

ital image signals for processing from the computer network 62 by way of a suitable communication channel, such as a telephone line, computer cable, ISDN line, etc. Typically, computer networks 62 include clients who generate jobs, wherein each job includes the image data in the form of a plurality of electronic pages and a set of processing instructions. In turn, each job is converted into a representation written in a page description language (PDL) such as Postscript® containing the image data. Where the PDL of the incoming image data is different from the PDL used by the digital printing system, a suitable conversion unit converts the incoming PDL to the PDL used by the digital printing system. The suitable conversion unit may be located in an interface unit 52 in the controller 50. Other remote sources of image data such as a floppy disk, hard disk, storage medium, scanner, etc. may be envisioned.

[0012] For on-site image input, an operator may use the scanner 64 to scan documents, which provides digital image data including pixels to the interface unit 52. Whether digital image data is received from scanner 64 or computer network 62, the interface unit 52 processes the digital image data in the form required to carry out each programmed job. The interface unit 52 is preferably part of the digital printing system 10. However, the computer network 62 or the scanner 64 may share the function of converting the digital image data into a form, which can be unutilized by the digital printing system 10.

[0013] As indicated previously, the digital printing system 10 includes one or more (1 to N) feeders 20, a print engine 30, one or more (1 to M) finishers 40 and a controller 50. Each feeder 20 preferably includes one or more trays, which forward different types of support material to the print engine 30. All of the feeders 20 in the digital printing system 10 are collectively referred to as a supply unit 25. All of the finishers 40 are collectively referred to as an output unit 45. The output unit 45 may comprise several types of finishers 40 such as inserters, stackers, staplers, binders, etc., which take the completed pages from the print engine 30 and use them to provide a finished product.

[0014] The controller 50 controls and monitors the entire digital printing system 10 and interfaces with both on-site and remote input units in the image input section 60. The controller 50 includes the interface unit 52, a system control unit 54, a memory 56 and a user interface 58. The system control unit 54 receives print engine information from sensors throughout the digital printing system 10. The user interface 58 includes an area holding a graphic representation or picture of the feeders 20, print engine 30 and finishers of the digital printing system 10. The user interface 58 permits an operator to monitor the document feeders 20, print engine 30 and finishers 40 by navigating through a series of menus by highlighting, clicking, double-clicking, etc. on a section or otherwise opening a section of the graphical representation of the user interface 58 to reach controls or information related to that component

of the digital printing system 10. Therefore, a user (also called an operator) can associate tasks done on the user interface 58 with their physical location on the digital printing system 10 and thereby enable faster and more intuitive navigation. The user interface 58 preferably includes at least a mouse 53, a keyboard 55 and a display unit 57 as shown in Figure 3. The display unit 57 has a display screen 59.

[0015] Figures 4-17 show a series of menus and graphical representations displayed on a display screen 59, which are used to reach controls or information related to components or supplies in the digital printing system 10. Figure 4 shows a printer status window 70 having a printer icon 72 including feeder icons A-D, print engine icon E, and finisher icons F-J. However, as indicated above, feeder icons and finisher icons can be added or removed so that the printer icon 72 is an accurate depiction of the printing system actually being used by the operator. The printer status window 70 also includes a job progress meter 74, which continuously informs the operator of the total time required to complete a print job (e.g. 33 minutes), the time that has elapsed since the print job began (e.g. 28 minutes) and the time remaining (7 minutes). This enables the operator to make choices as to whether to stop or suspend the current job in order to process a higher priority job. Figure 4 also shows a pathway access window 76, which also provides access to information and control of the digital printing system 10.

[0016] By highlighting and then clicking on the print engine icon E of the printer status window 70 or by clicking on the print engine icon/button of the pathway access window 76, print engine information 78 is displayed as shown in Figure 5. The print engine information is a summary of the current amount of consumables such as toner as well as the current magnification, registration and color curve settings. By clicking on consumables, more detailed consumable information 80 regarding the current toner levels in the print engine 30 are displayed as shown in Figure 6. This window shows the user the current toner levels and the amount needed by each job in the print ready queue. The system alerts the user that it will run out of toner if all the jobs currently in the print ready queue combined require more toner than is currently available. Magenta is an example of this situation. All the jobs in the queue combined require more magenta toner than is available, so in 22 minutes, the system will halt. After clicking on magnification, more detailed magnification information and controls 82 are displayed as shown in Figure 7. By moving the slider control 84, the operator can adjust the magnification of the printed image on the support material. By clicking on registration, the operator can access more detailed information and controls on image to stock, perfecting registration, and color registration as shown in Figures 8-10. The image to stock tab houses controls that allow the user to adjust the position (both vertically or horizontally) of a printed image on the front side of a page. The

perfecting registration tab holds controls which allow the user to adjust the position (both vertically or horizontally) of a printed image printed on the back side of the page to line up with the image printed on the front of the page when two-sided printing is enabled. The color registration tab houses controls enabling the user to adjust the relative positions of each color individually on a page (e.g. cyan, magenta, yellow, and black) either horizontally or vertically.

[0017] Figure 11 shows system color curves, which indicate the toner density applied to the electrostatic latent image and subsequently permanently affixed to support material.

[0018] As indicated above, an operator can monitor the feeders 20 by highlighting and then clicking on a tray of a feeder as shown in Figure 12. Figure 12 shows a display of feeder A tray 1 information 92, which provides the attributes of the support material or stock currently in tray 1 of feeder A. The operator can change the type of stock contained in the tray from here and also turn the tray override setting on or off. A brief summary of the stock attributes in each tray of each feeder is displayed by clicking on feeders in the pathway access window 76 as shown in Figure 13. Similarly, an operator can monitor finishers 40 by highlighting and then clicking on a finisher 40, for example a tray 2 of inserter F as shown in Figure 14. Figure 14 shows a display of inserter F tray 2 information 94, which provides the attributes of the support material or stock currently in tray 1 of inserter F. An inserter F inserts preprinted material as needed to complete a job. The operator can change the type of stock contained in the tray from here and also turn the tray override setting on or off. By highlighting and clicking on stacker G, stapler H or binder I, stacker information 95, stapler information 96, and binder information 97 is displayed as shown in Figures 15, 16 and 17 respectively. The operator can change some settings within these windows. In the settings window for stacker G, the operator can use the unload button and adjust offset and capacity limit settings. In the settings window for the stapler and binder (H and I), settings can be entered for the staple color and type. Further, folding, trimming, and rotation options can be turned on or off. A brief summary of the finisher information 98 of each finisher 40 is displayed by clicking on the finishers icon/button in the pathway access window 76 as shown in Figure 18.

[0019] Figure 19 shows one example of accessing information and controls. An operator points the cursor 71 over a section of the printer icon 72, which represents one of the modules of the digital printing system 10. The operator then clicks, double clicks or otherwise commands the controller 50 to prompt the selected module such as the print engine 30, a feeder 20 or finisher 40 for status information. Sensors in each module send status information to the controller 50, which is then displayed on display screen 59 in the window along with controls relating to the specific module. Toner and magnification controls are just two examples. Some of

the modules continuously send status information at predetermined time intervals to the controller 50, and the user interface 58 updates the information appearing on the display screen 59. Some of the status information does not change unless the operator changes the information, e.g. magnification. The operator can now view current status information and also control the module by way of the user interface 58 in controller 50.

10 Claims

1. A graphical user interface for providing operating information of a printing system on a display screen (10) comprising:

15 a depiction of a printing system shown on the display screen including icons of at least one feeder (20), print engine (30) and finisher (40); and,
20 a display unit displaying operator information of a desired icon (20,30,40) on the display screen (10) by selecting the desired icon (20,30,40).

2. A graphical user interface according to claim 1, wherein the desired icon (20,30,40) is selected by pointing a cursor at the desired icon and keying a mouse or a key on a keyboard to select the desired icon.

3. A graphical user interface according to claim 1, wherein the desired icon (20,30,40) is selected by highlighting the desired icon and keying a mouse or a key on a keyboard to select the desired icon.

4. A graphical user interface according to any one of the preceding claims, further comprising:

40 a multiuse job progress indicator (74), including total time, elapsed time and time remaining for a current print job, shown on the display screen (10).

5. A graphical user interface according to any one of the preceding claims, further comprising:

45 a depiction of a pathway access window.

6. A graphical user interface according to any one of the preceding claims, wherein the operator information comprises:

50 a depiction of different toners available to the printing system, or
a depiction of magnification, or
a depiction of registration information, or
a depiction of tray information, or
a depiction of finisher information, or
a depiction of stacker information, or

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a depiction of inserter information, or
a depiction of stapler information.

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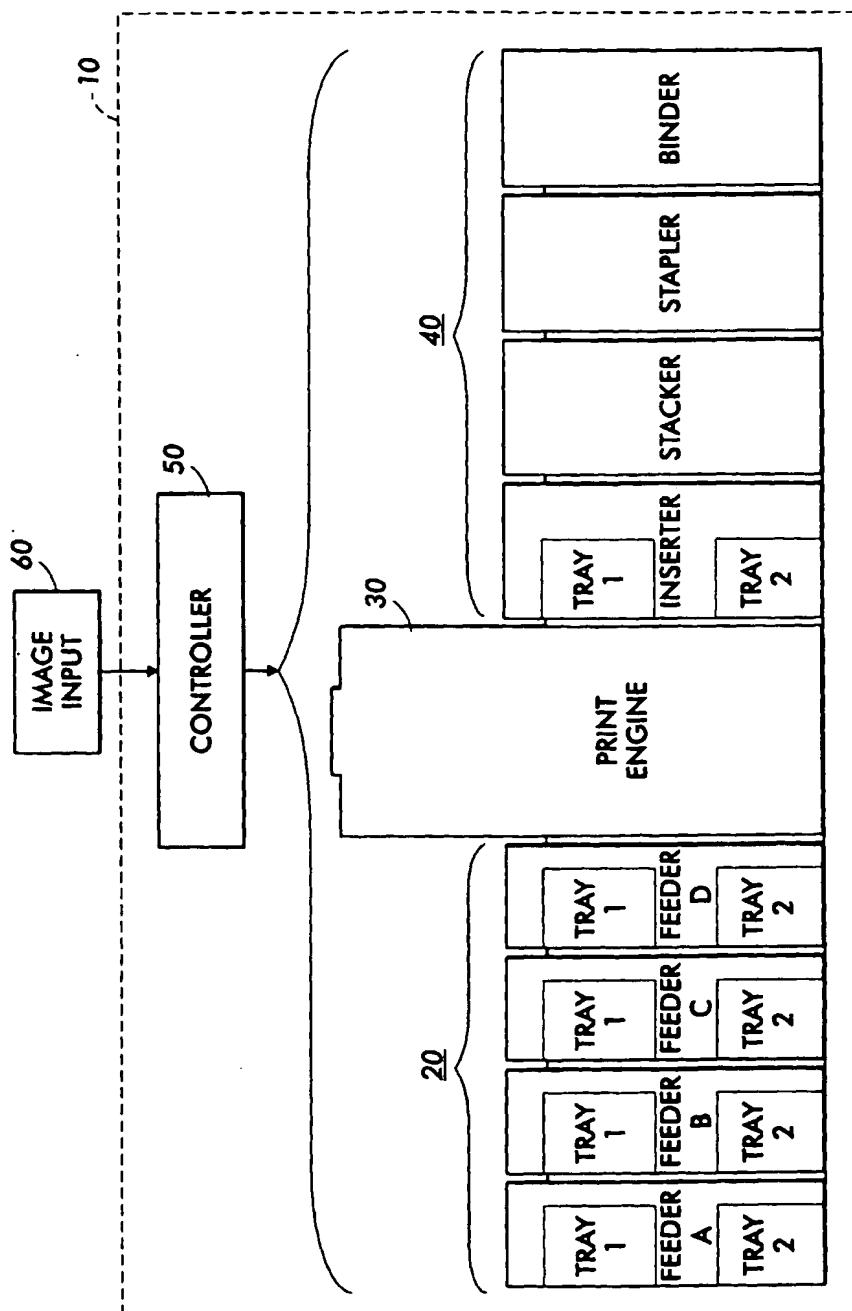


FIG. 1

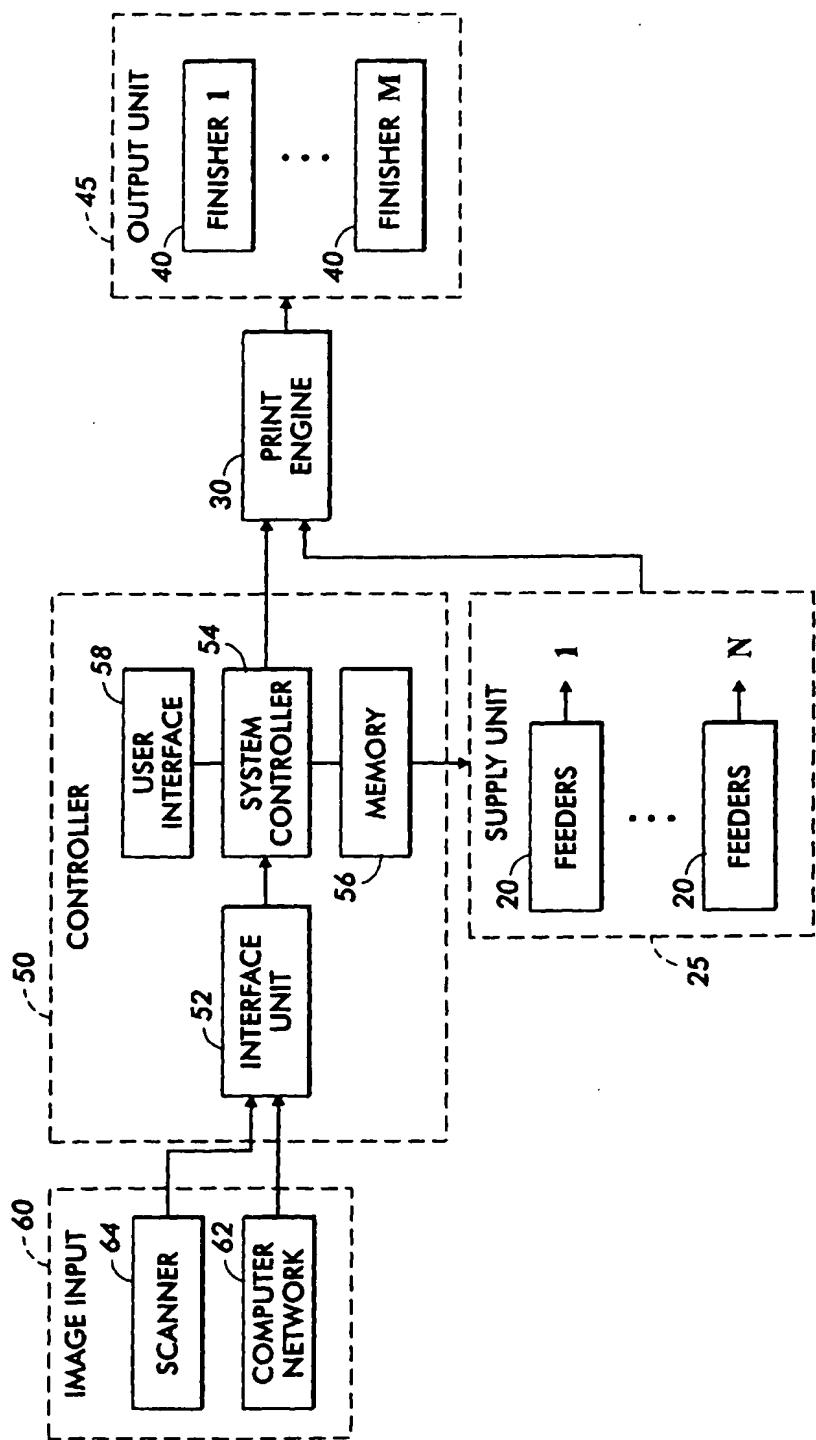
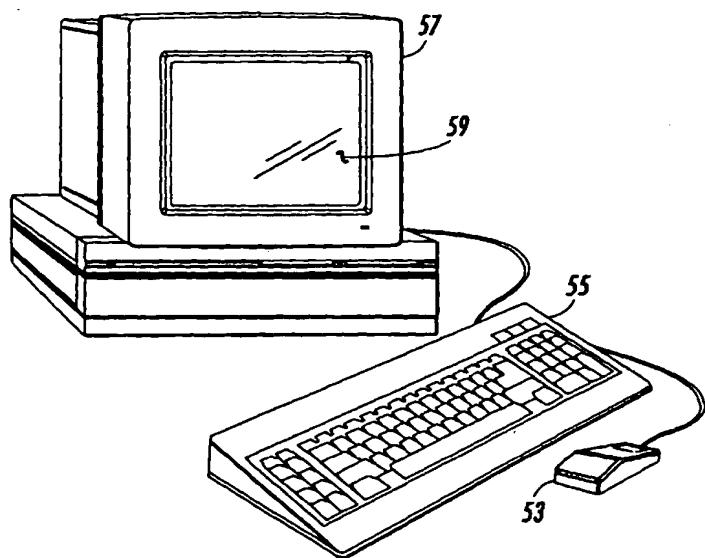


FIG. 2

FIG. 3



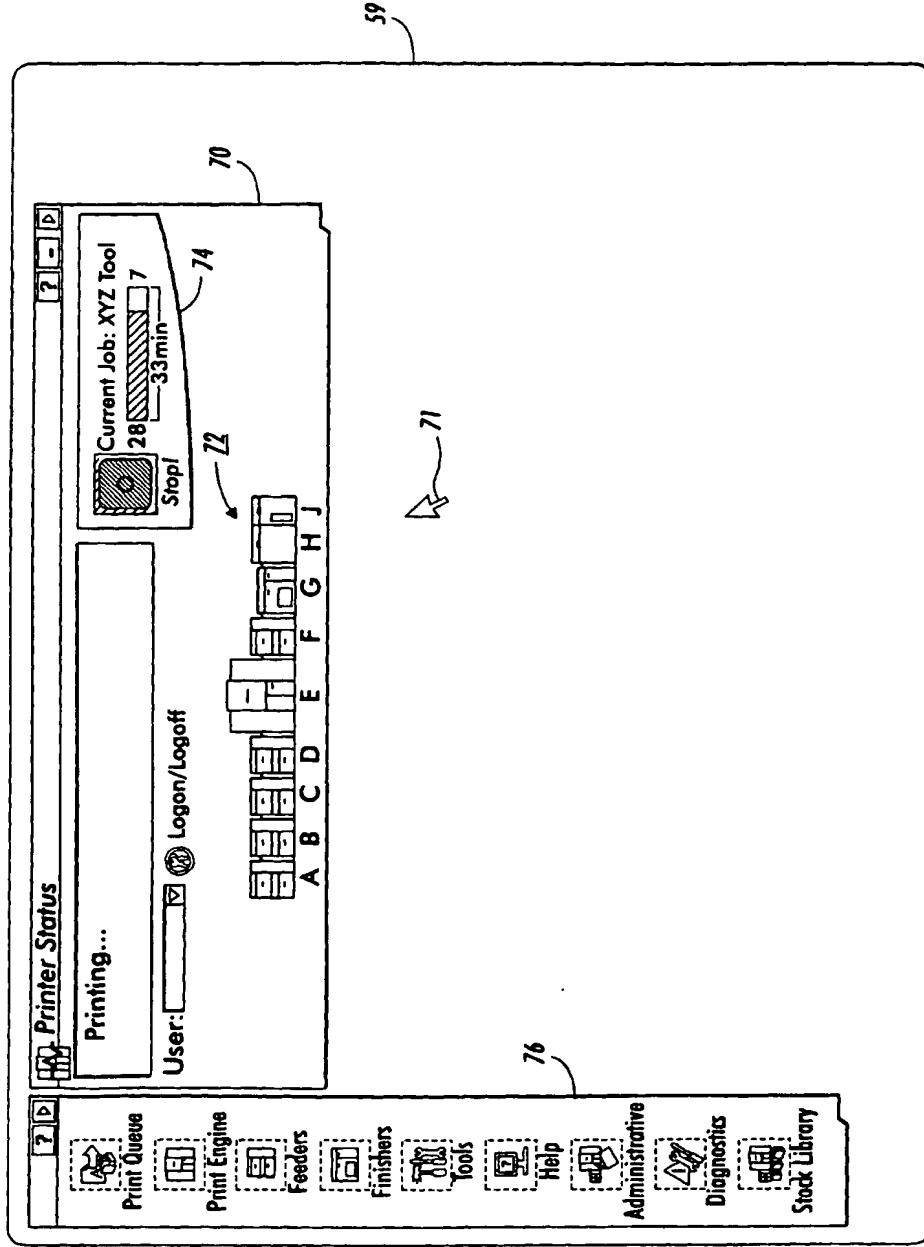


FIG. 4

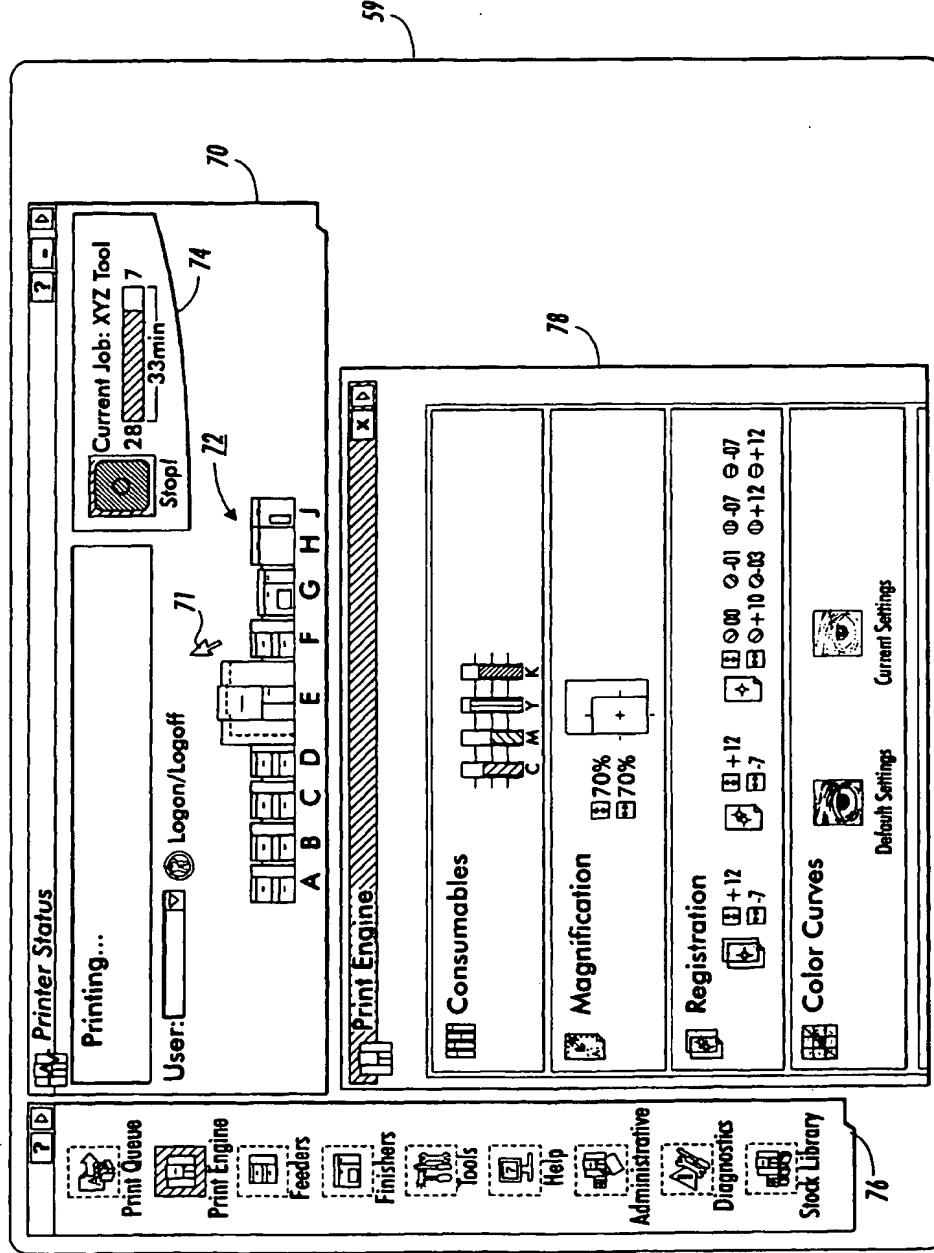


FIG. 5

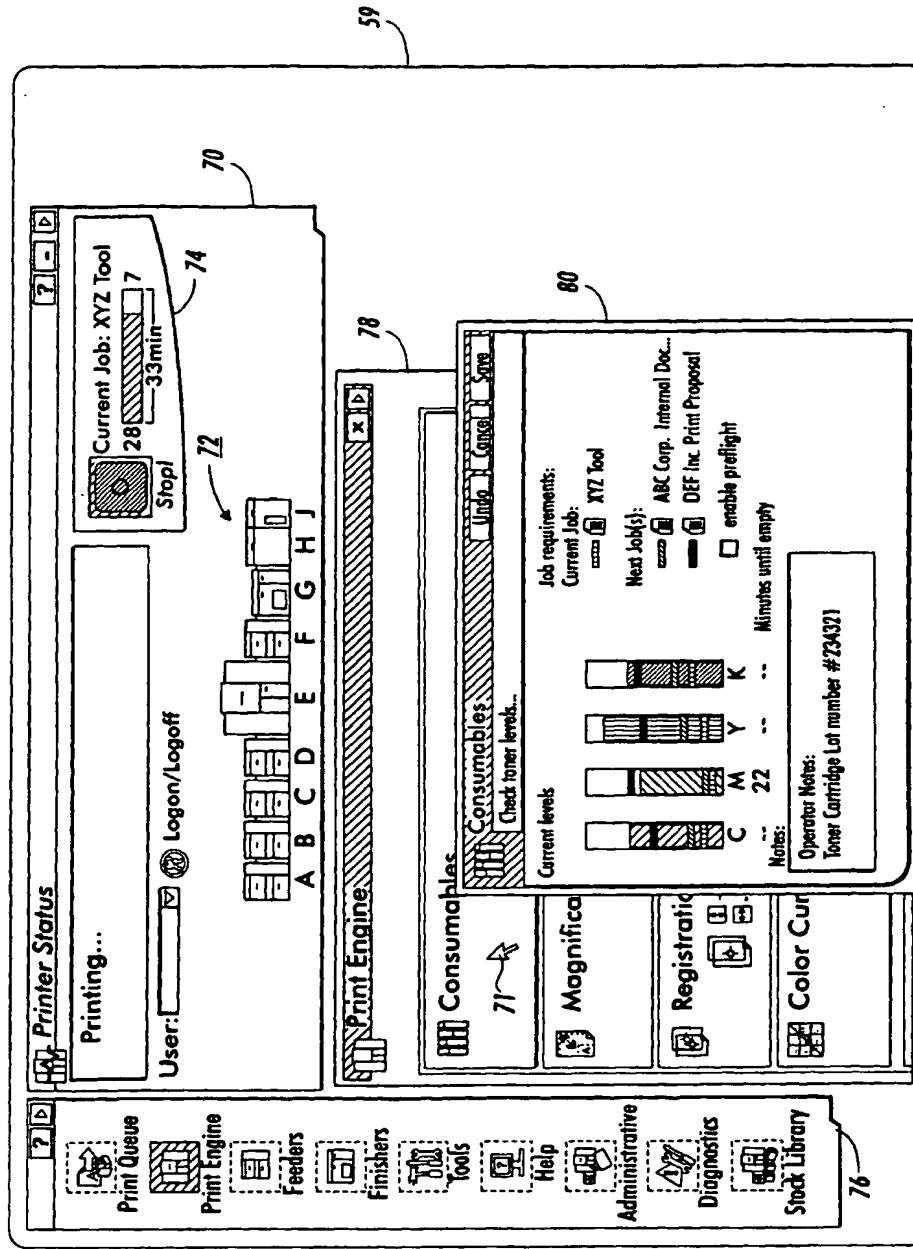


FIG. 6

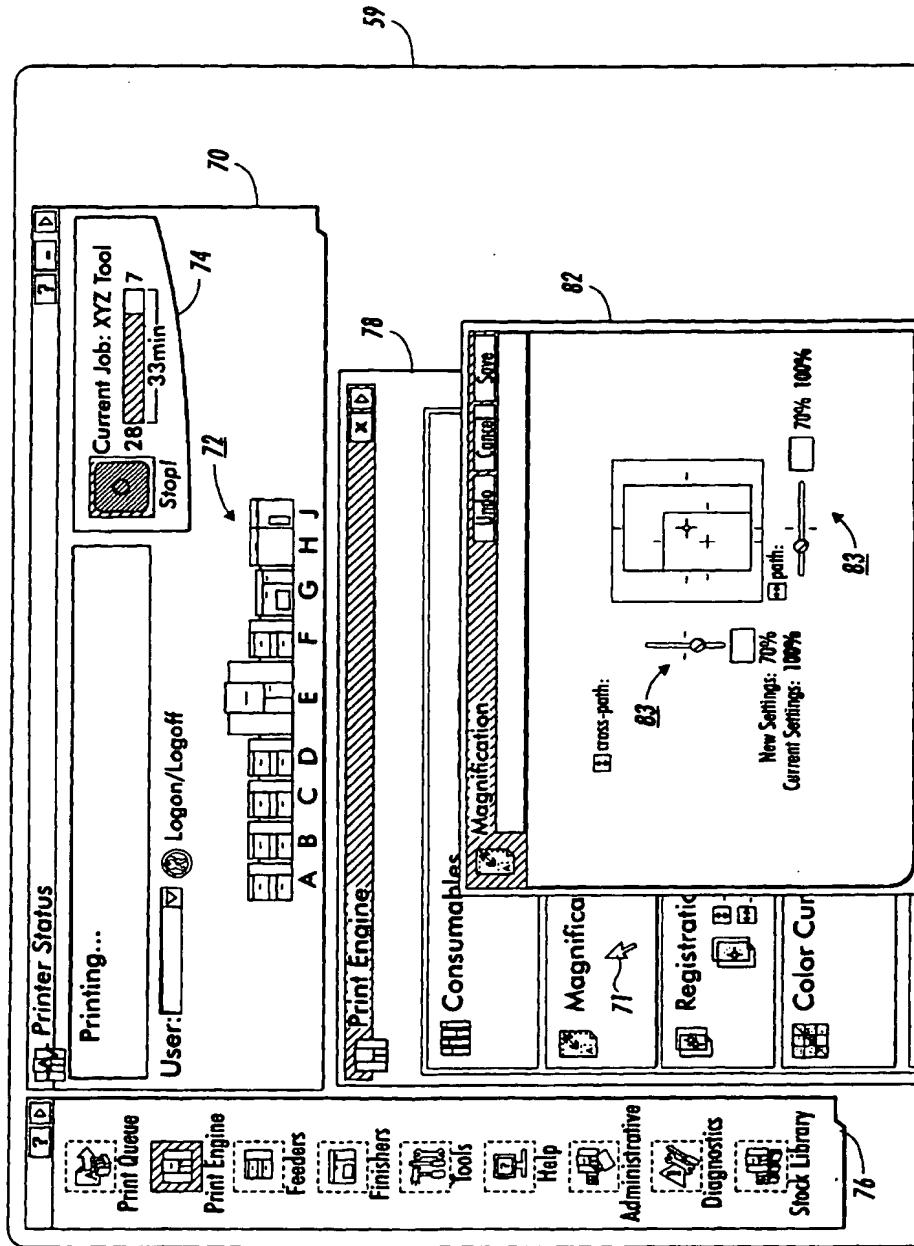


FIG. 7

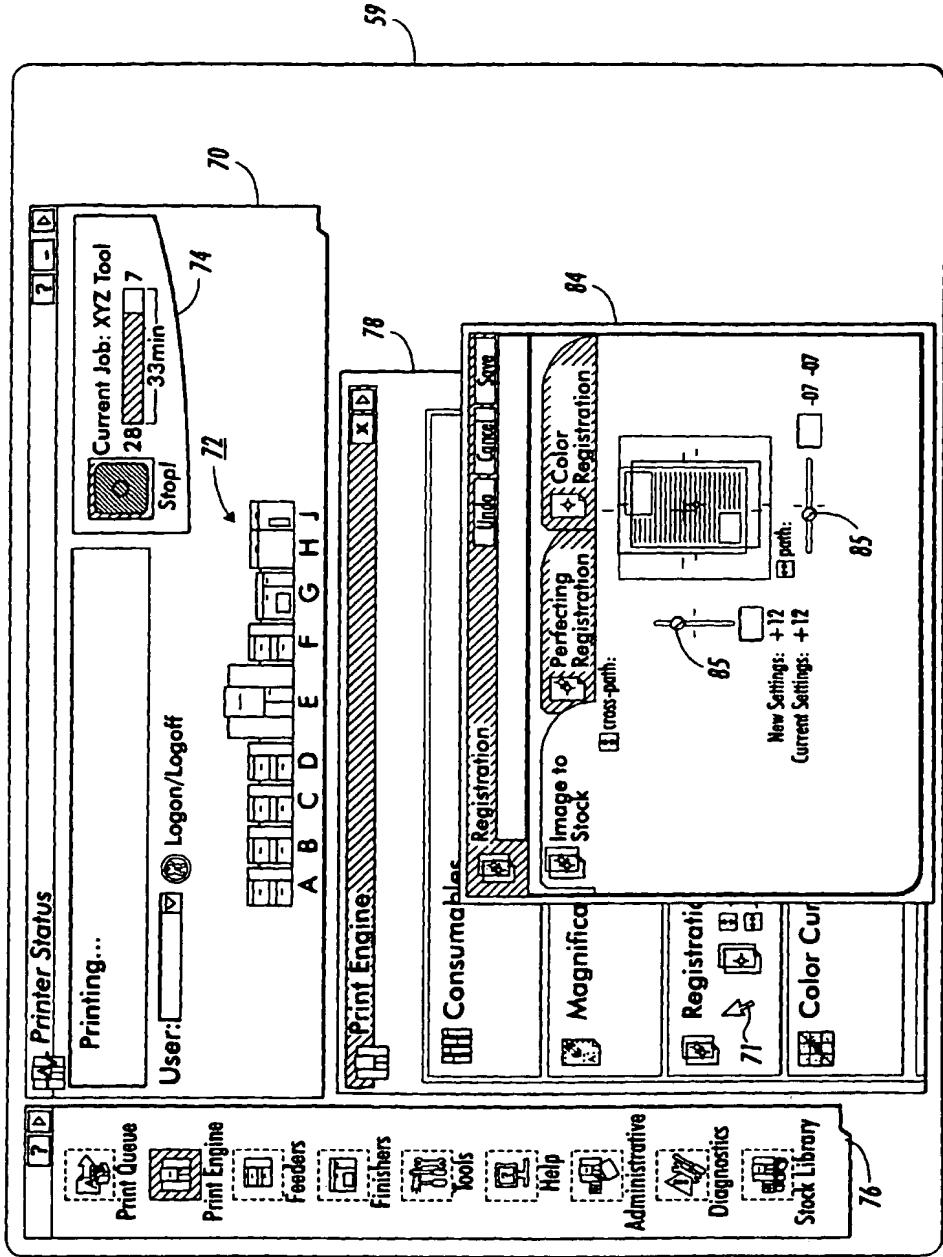


FIG. 8

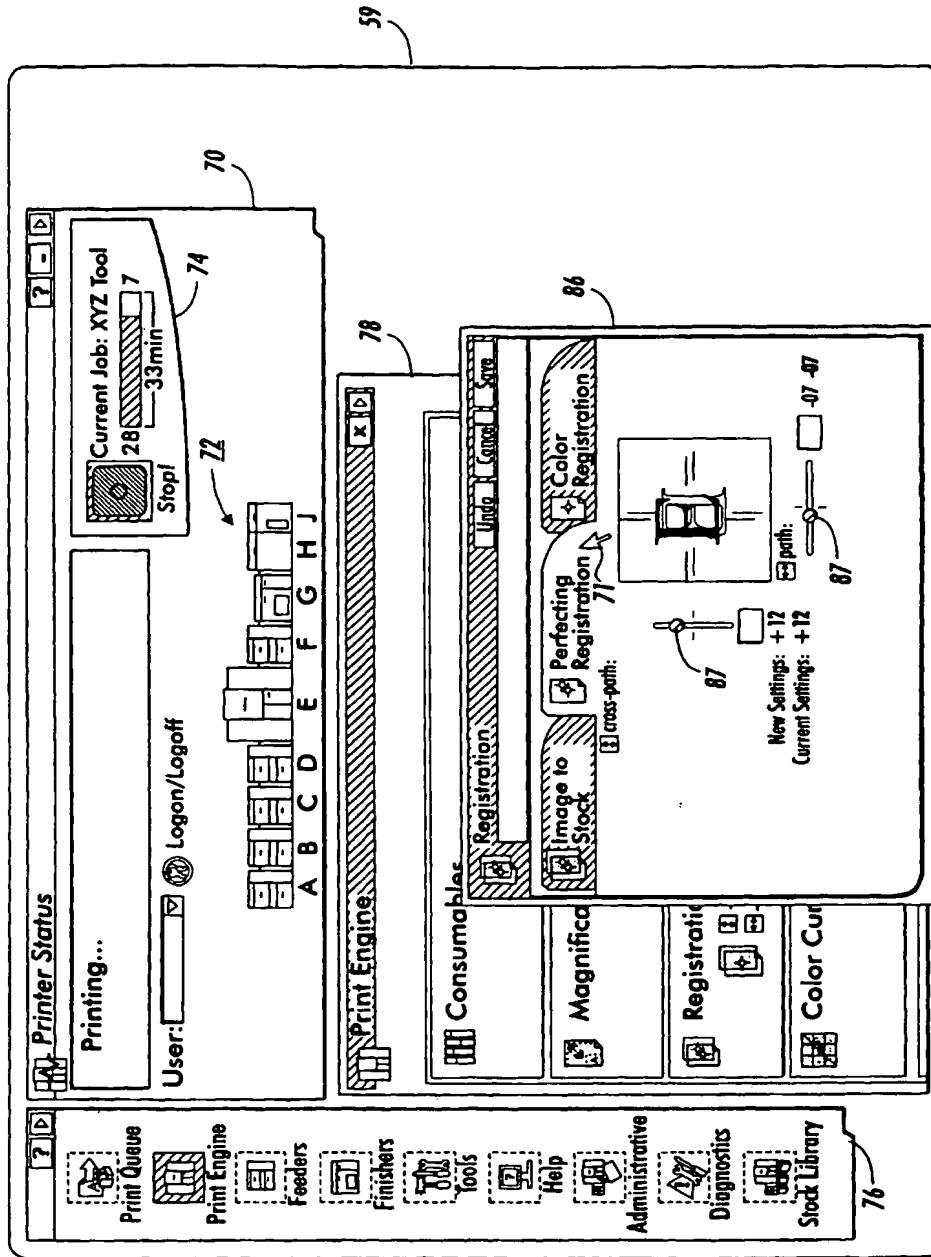
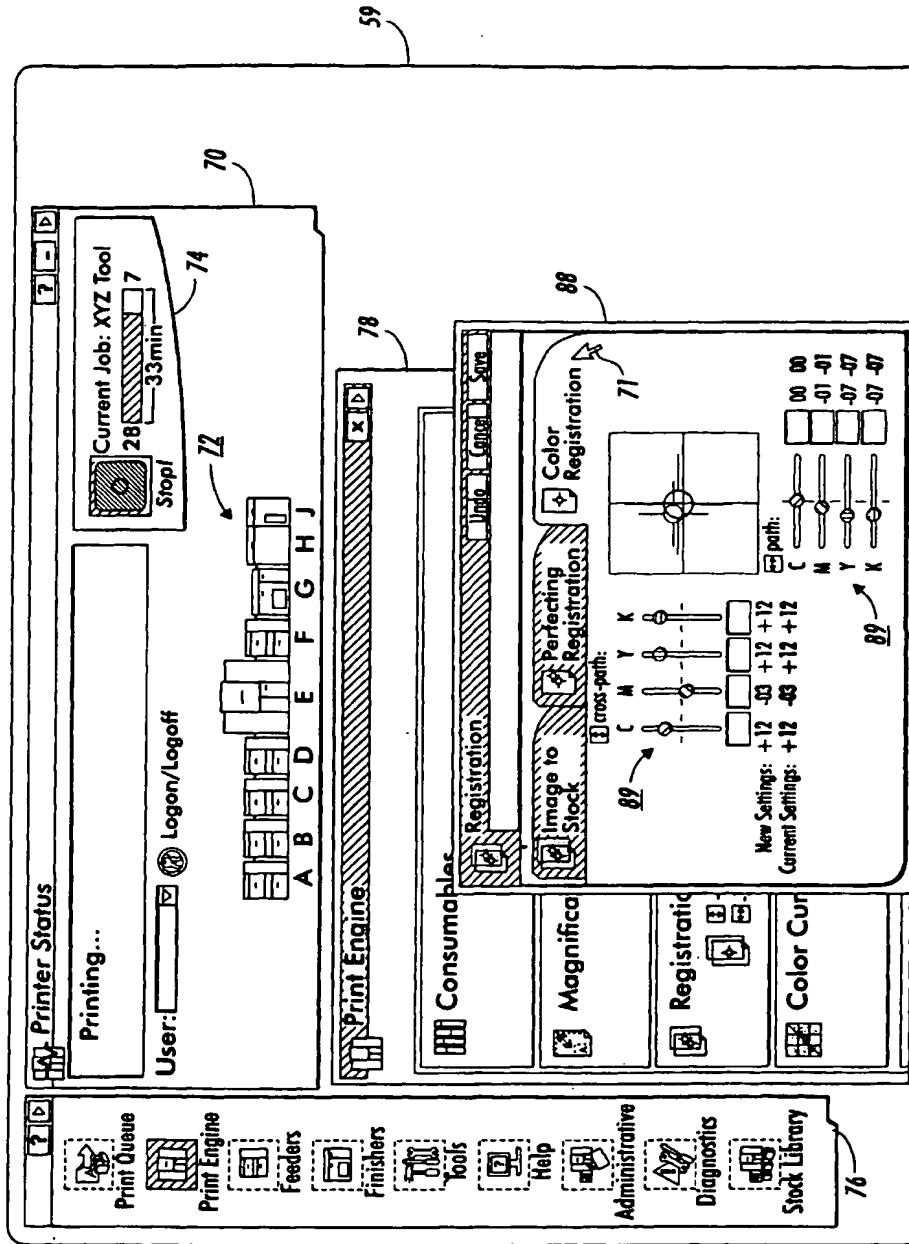


FIG. 9



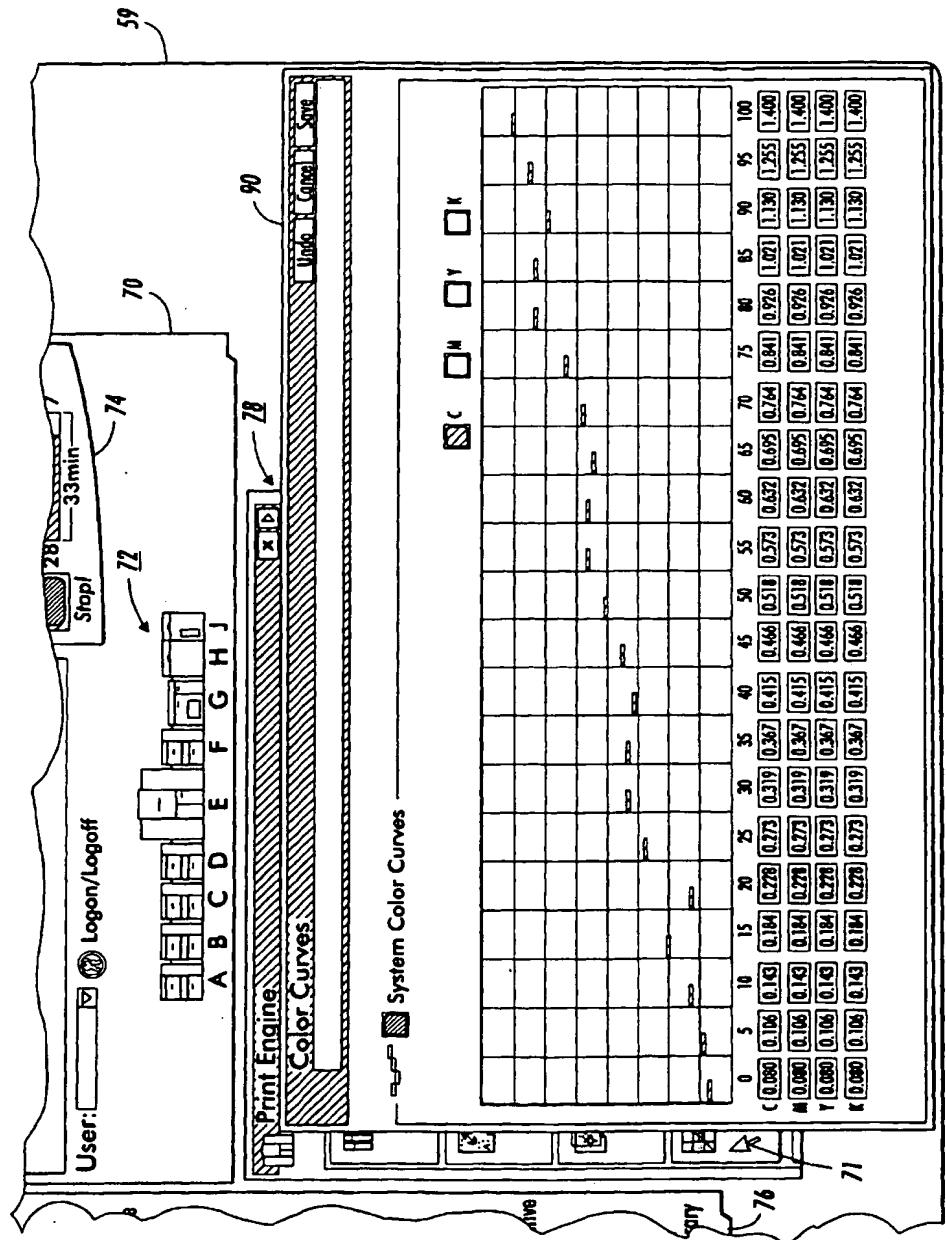


FIG. 11

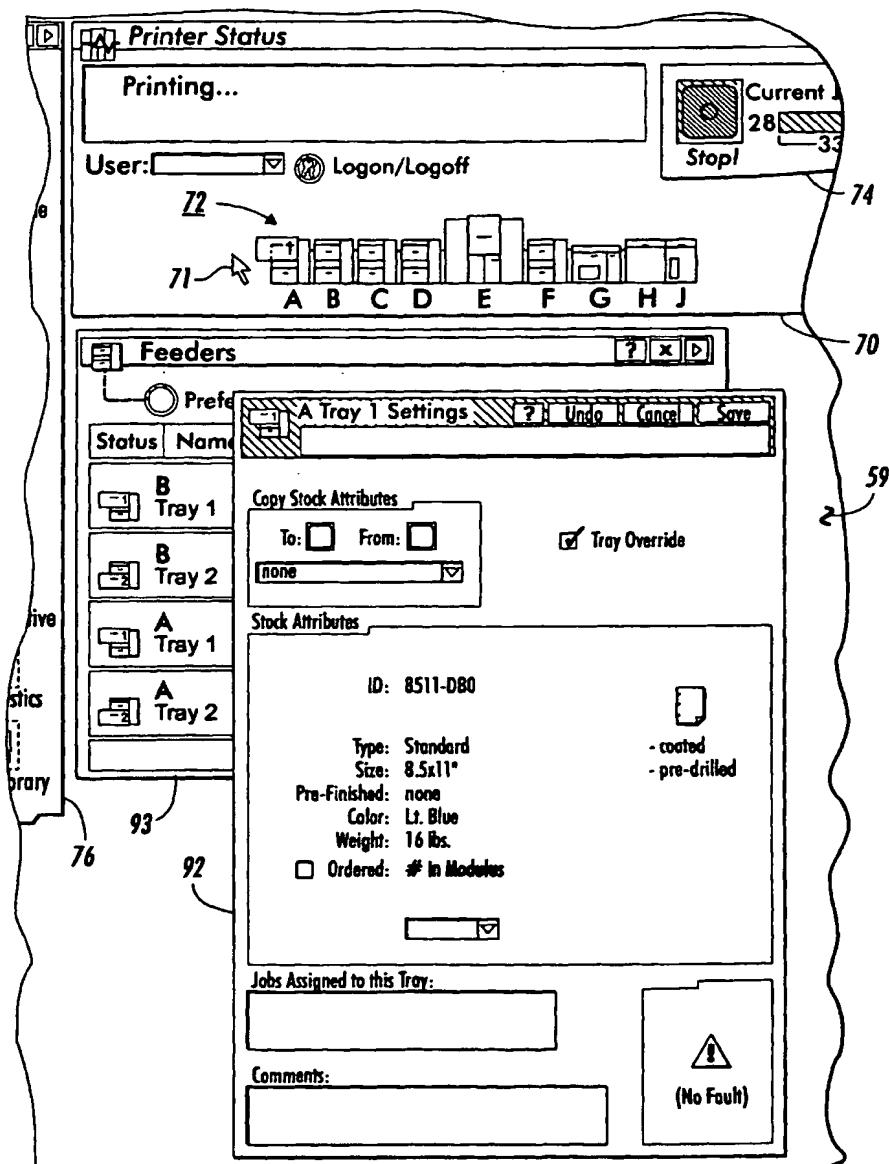


FIG. 12

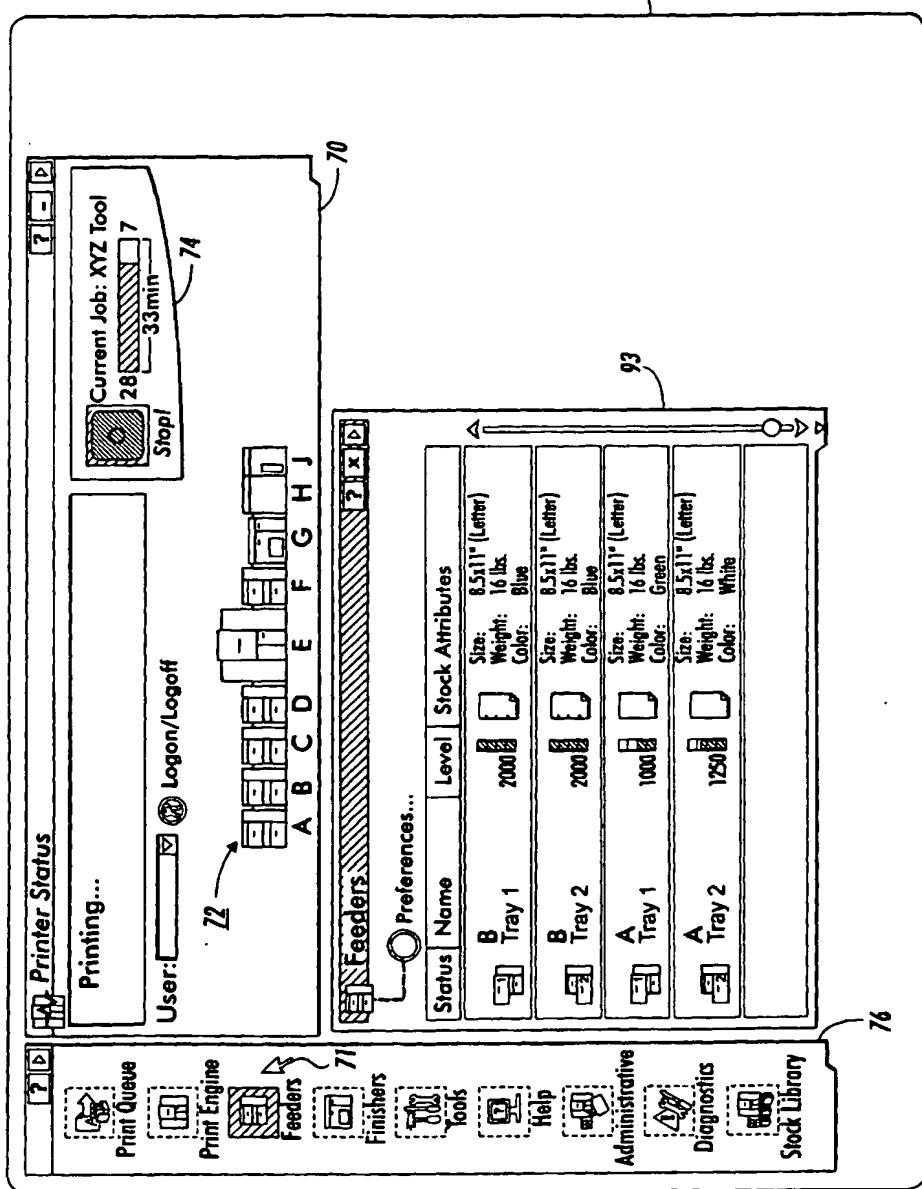


FIG. 13

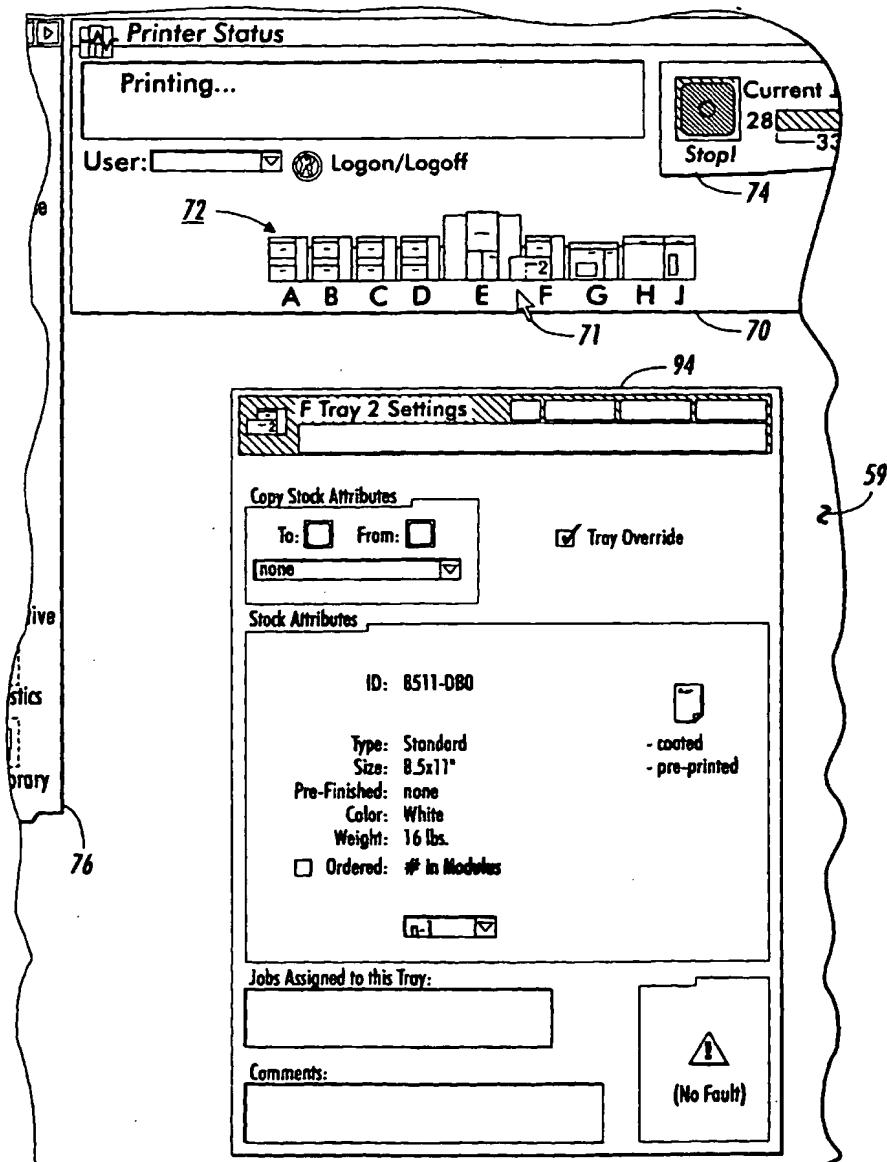


FIG. 14

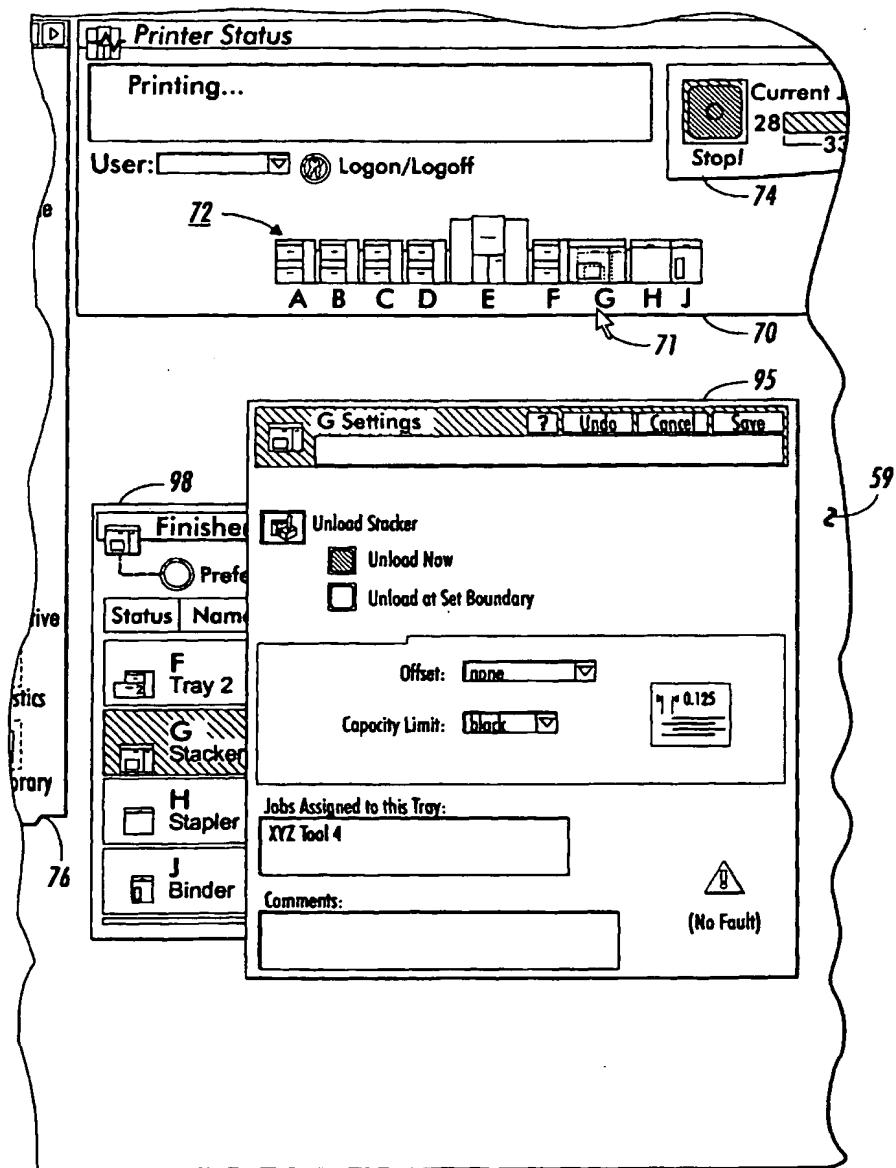


FIG. 15

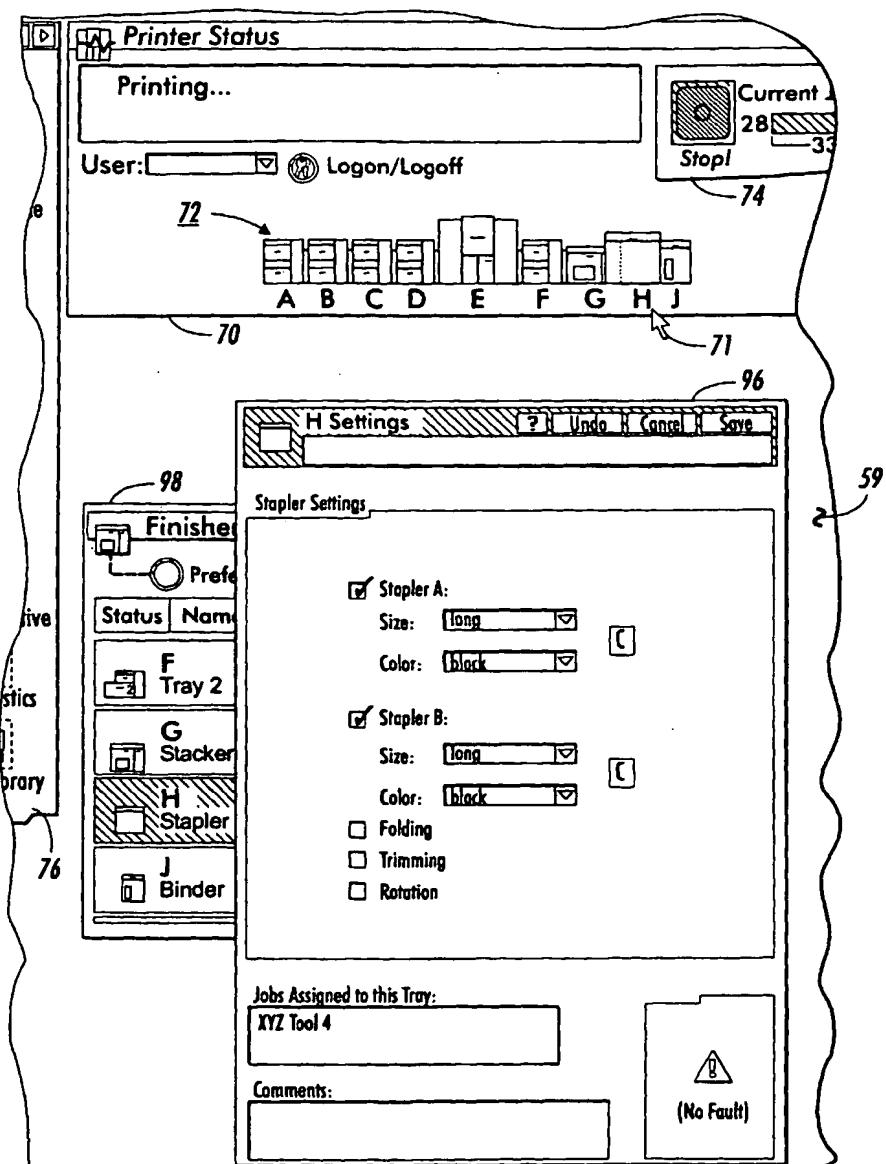


FIG. 16

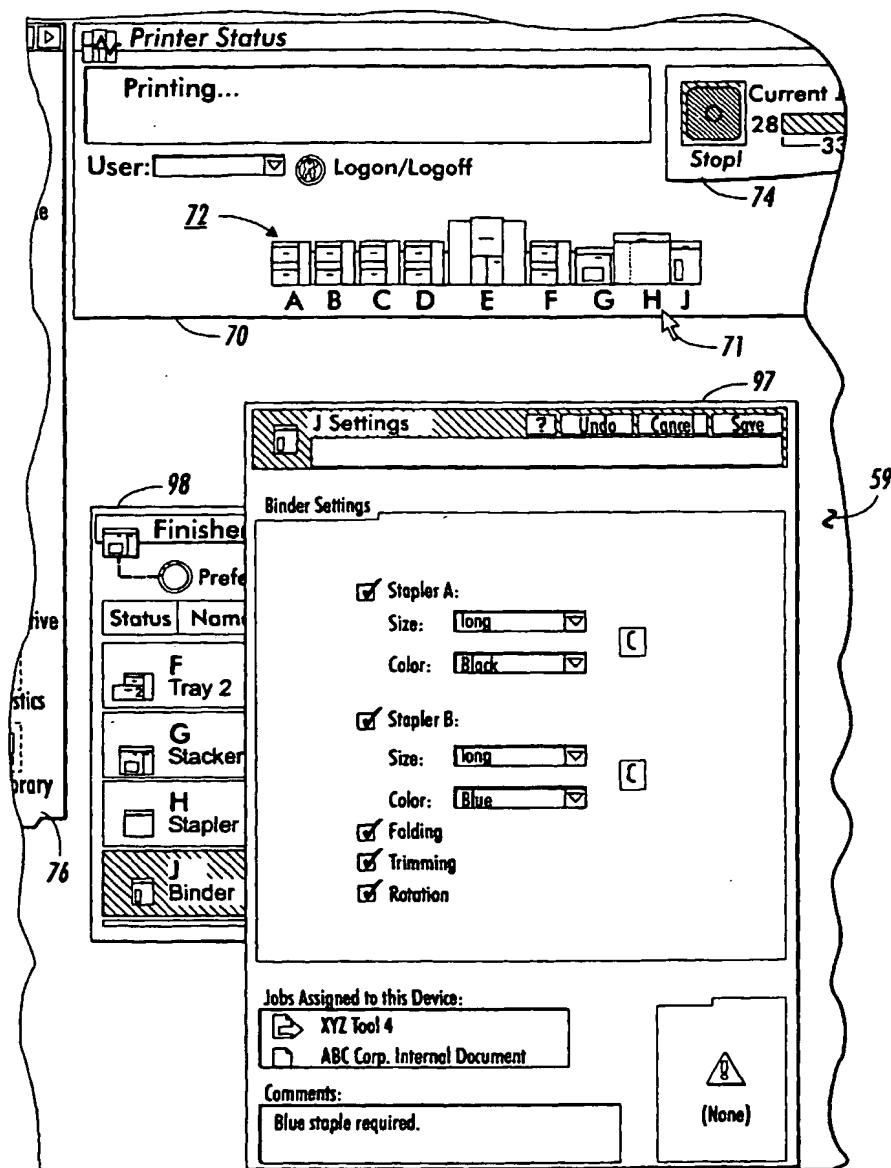


FIG. 17

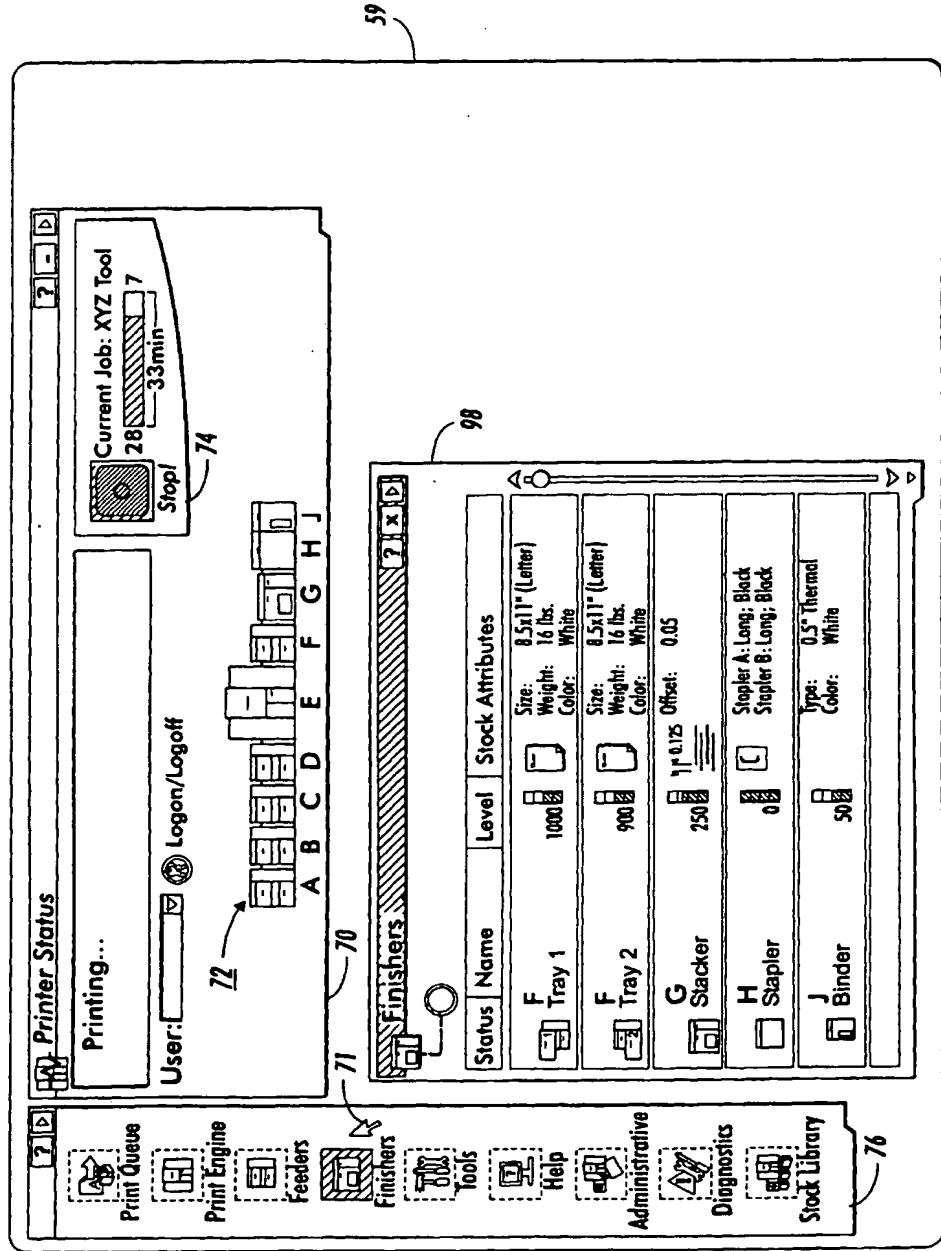


FIG. 18

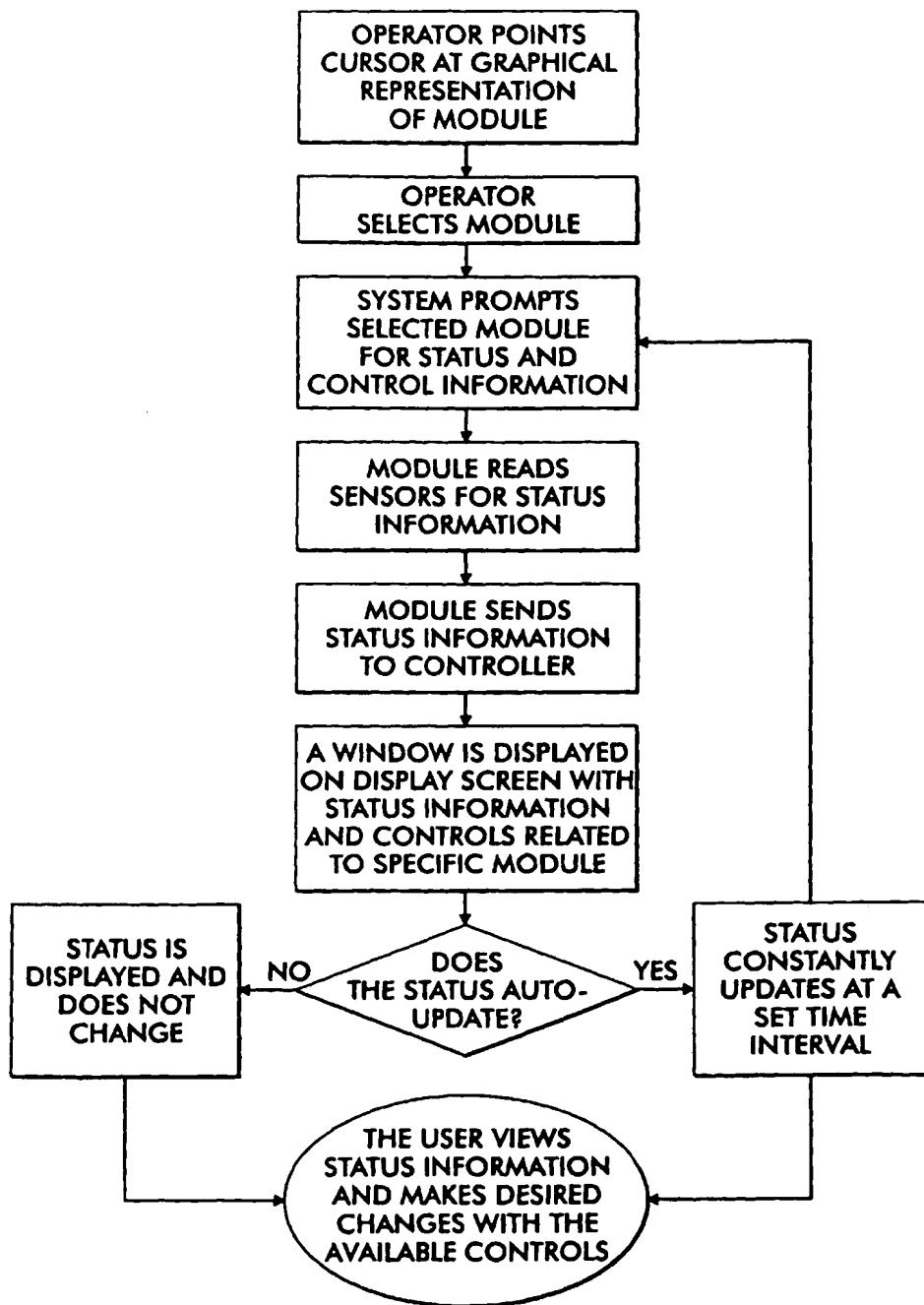


FIG. 19

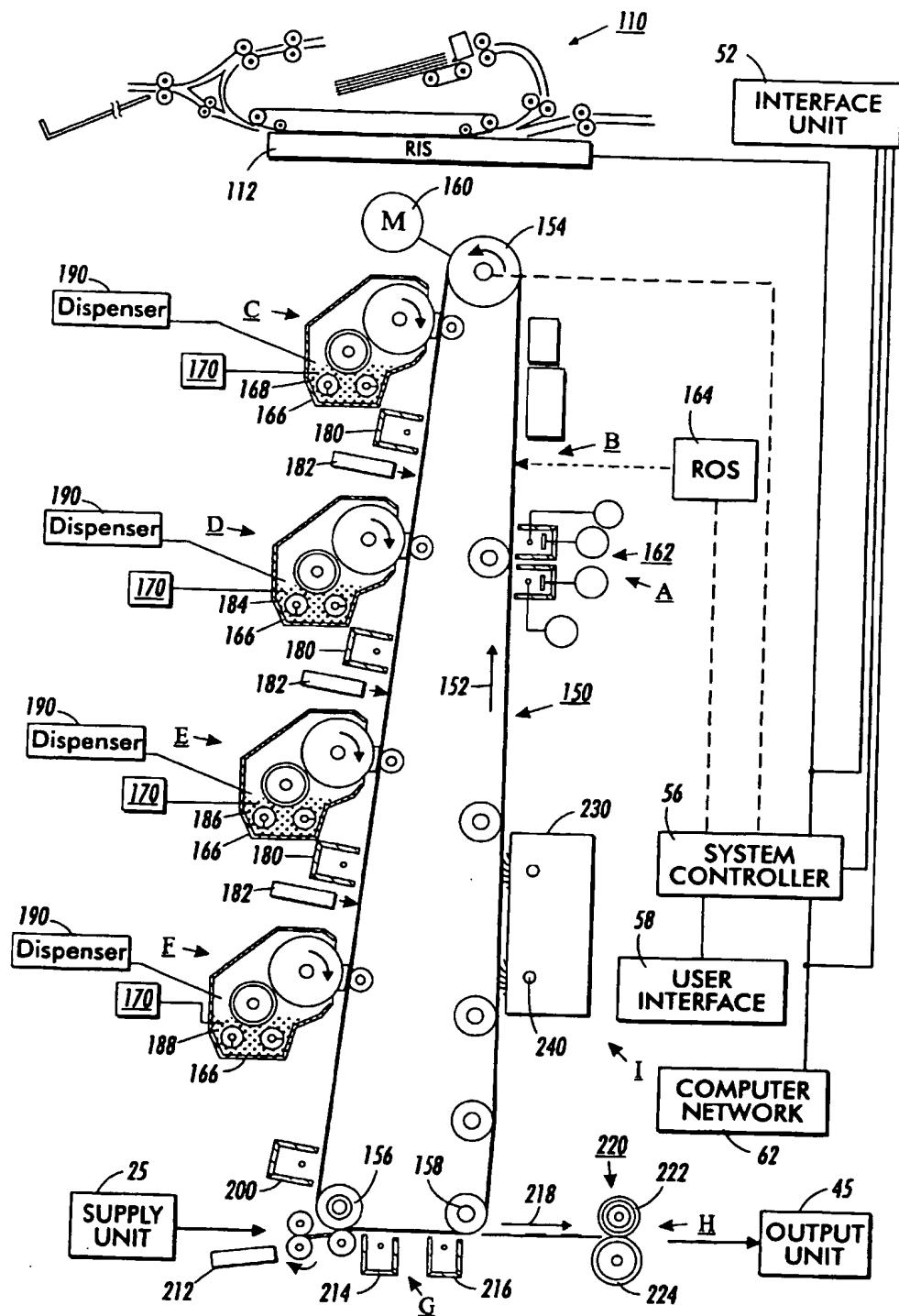


FIG. 20

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